Claims

1. A B moiety of a pore-forming binary A-B toxin, wherein said B moiety comprises a mutation that inhibits its pore-forming ability.

2. The B moiety of claim 1, wherein said B moiety is anthrax protective antigen.

3 The B moiety of claim 1, wherein said B moiety lacks pore-forming ability.

4. The B moiety of claim 1, having an amino acid sequence that is at least 80% identical to SEQ ID No.: 21 and that has an alteration selected from the group consisting of:

a) K397A;
b) K397D;
c) K397C;
d) K397Q;
e) D425A;
f) D425N;
g) D425E;
h) D425K;
i) F427A;
j) K397 + D425K double-mutation;
k) K395D + K397D + D425K + D426K quadruple mutation;
l) K397D +D425K + F427A triple mutation;

m) F427A + ΔD2L2 double mutation;

n) K397D + F427A +ΔD2L2 triple mutation;

o) K397D + D425K + F427A +ΔD2L2 quadruple mutation;

p) F427D;

q) F427K; and

(r) ΔD2L2.

5. The B moiety of claim 1, wherein said mutation is not the deletion of amino acids 302-325 of anthrax protective antigen (SEQ ID NO. 12).

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6. A vaccine composition comprising a B moiety of a pore-forming binary A-B toxin or a fragment thereof in a pharmaceutically acceptable carrier, wherein said B moiety comprises a mutation that inhibits its pore-forming ability.

7. The vaccine composition of claim 6, wherein said B moiety is anthrax protective antigen.

8. The vaccine composition of claim 6, wherein said B moiety is inactivated by chemical or physical means.

9. A method of preventing bacterial infection in a mammal, said method comprising administering to said mammal a vaccine comprising a B moiety of a pore-forming binary A-B toxin or a fragment thereof in a pharmaceutically acceptable carrier, wherein said B moiety comprises a mutation that inhibits its pore-forming ability.

10. A method of treating bacterial infection in a mammal, said method comprising administering to said mammal a vaccine comprising a B moiety of a pore-forming binary A-B toxin or a fragment thereof in a pharmaceutically acceptable carrier, wherein said B moiety comprises a mutation that inhibits its pore-forming ability.

11. The method of claim 9 or 10, wherein said vaccine is administered with an adjuvant.

12. A mutant B moiety of a pore-forming binary A-B toxin, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming ability, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.

13. The mutant B moiety of claim 12, wherein said mutant B moiety is anthrax protective antigen.

14. The mutant B moiety of claim 13, having the ability to bind lethal factor or edema factor.

15. The mutant B moiety of claim 12, having the ability to compete with said naturally-occurring B moiety for binding to a receptor on the surface of a mammalian cell.

16. The mutant B moiety of claim 12, having the ability to bind said naturally-occurring B moiety.

17. The mutant B moiety of claim 12, having the ability to oligomerize with said naturally-occurring B moiety to form a complex that has reduced ability to form a pore.

18. The mutant B moiety of claim 17, wherein said complex lacks the ability to form a pore.

19. The mutant B moiety of claim 12, having an amino acid sequence that is at least 80% identical to SEQ ID No.: 21 and that has an alteration selected from the group consisting of:

a) K397D + D425K double mutation;

b) ΔD2L2;

c) K395D + K397D + D425K + D426K quadruple mutation;

d) D425K;

e) F427A;

f) K397D +D425K + F427A triple mutation;

g) F427A + ΔD2L2 double mutation;

h) K397D + F427A +ΔD2L2 triple mutation;

i) K397D + D425K + F427A +ΔD2L2 quadruple mutation;

h) F427D; and

i) F427K.

20. The mutant B moiety of claim 12, comprising a deletion of at least 5 amino acids of the D2L2 loop.

21. A method of preventing bacterial infection in a mammal, said method comprising administering to said mammal a mutant B moiety of a pore-forming binary A-B toxin or a fragment thereof, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming ability, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.

22. A method of treating bacterial infection in a mammal, said method comprising administering to said mammal a mutant B moiety of a pore-forming binary A-B toxin or a fragment thereof, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming ability, and wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.

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23. The method of claim 9, 10, 21, or 22, wherein said B moiety or said mutant B moiety is anthrax protective antigen and said bacterial infection is an anthrax infection.

24. The method of claim 9, 10, 21, or 22, further comprising administering to said mammal an antibody that binds said naturally-occurring B moiety.

25. The method of claim 9, 10, 21, or 22, wherein said mammal is a human.

26. The method of claim 25, wherein said mammal has been exposed to *B. anthracis* spores.

27. An purified antibody that specifically binds a naturally-occurring B

moiety of a pore-forming binary A-B toxin with greater affinity than a mutant B moiety of said toxin, wherein said mutant B moiety comprises a mutation that inhibits its pore-forming ability.

28. The antibody of claim 27, wherein said mutant B moiety inhibits the pore-forming ability of a naturally-occurring B moiety of said toxin.